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Herpetofauna of the Nyika Plateau (Malawi and Zambia)

by

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SYNOPSIS

The Nyika is a large grassland plateau in east central Africa. It is over 750 square miles in area and 6,500-8,551 feet in elevation. Principal community types on the plateau are: grasslands, marshes, streams, ponds, rocky outcrops, montane evergreen forests and forest margins. *Uapaca-Brachystegia* woodlands border the gently undulating plateau. Included in the plateau communities are 11 species of amphibians, 6 lizards, 1 chameleon, and 9 snakes. Five of these species are known only from the plateau which supports several endemic plants, birds, and mammals. Herpetological collections and studies made during 1962-1964 are the first on the plateau since those of Loveridge in 1948, and cover the longest observation period made there. Species accounts, as well as ecological descriptions, are given; they include collection data, measurements, and observations on abundance, seasonal and breeding activity, eggs, larvae, calls and color variation. New records for the plateau are: *Xenopus l. laevis*, *Bufo pusillus*, *Ptychadena porosissima*, *P. uzungwensis*, *Hyperolius nasutus*, *H. mertensi*, *Chamaesaura miopropus*, *Python sebae*, *Lycophidion capense*, *Pseudaspis cana*, *Atheris nitschei rungweensis*.

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INTRODUCTION

The Nyika Plateau, located in the northern region of Malawi (Nyasaland) and the eastern edge of Zambia (Northern Rhodesia), is a high, rolling grassland lying roughly between 10° 20′ and 11° south latitude and 33° 30′ and 34° east longitude. (Figs. 1, 5.) Its area is approximately 750 square miles, excluding the *Brachystegia* slopes. Most of the plateau lies in Malawi, but the western edge, a strip of approximately 29 square miles, is in Zambia. Elevations of the short-grass range are from approximately 6,500 to 8,551 feet. Structurally, the plateau is the western shoulder of part of the southern Great Rift Valley. Lake Nyasa, which fills the rift to the east, lies below that edge of the plateau at an elevation of approximately 1,550 feet.

The topography appears as a well-weathered erosion landscape (Fig. 2). At the heads of many small streams and dambos (marshes) between the gently rounded hills are relic patches of virgin evergreen forests. On the eastern plateau these approach the character of a true rain forest. Annual rainfall is approximately 45 inches, but may reach 70 inches in the eastern forests. About 90% of this falls from December through April although heavy mists often relieve the dry season. Annual mean extreme temperatures fall between 45-65°F; however, erratic frosts may occur from late May to October.

The Nyika, one of the most interesting and distinctive areas of Central Africa, has been described by Brass (1953), Cater (1954), and Lemon (1964). Loveridge (1953c) and Benson (1954) discussed the faunal significance of the area.

The first collection of herpetofauna of the Nyika was made by Alexander Whyte in the latter part of the 19th Century. His Malawi material was reported by Boulenger (1897). Not until Arthur Loveridge visited the area in October-November, 1948, was another extensive collection made on the plateau. Although Loveridge spent only three weeks on the Nyika, he found many of the species occurring there.

Dr. Stewart spent much of the time from October, 1963, to July, 1964, on the plateau. Her interests were primarily with the amphibians. Mr. Wilson collected on the plateau many times from August, 1962, until 1964. His interests were primarily with the reptiles. His field work centered in the Zambian portion, an area not studied by Dr. Stewart. We do not assume that species included here are all that occur on the Nyika. Others may be found in different localities on the extensive plateau. Photographs of habitats are by Stewart. The taxonomy follows Poynton (1964a, b) and Loveridge (1953a). Collections from the Zambian Nyika are in the Umtali Museum, Rhodesia; the majority of the Malawi collections are in the United States National Museum, Washington, D.C.

PRINCIPAL COMMUNITIES

The Grassland (Fig 2). This covers the major part of the plateau proper. It is short grass composed of many species. *Loudetia simplex*, *Exotheca abyssinica*, *Andropogon schirensis*, *Trachypogon spicatus*, *Danthonia* sp., *Monocymbium cerisiiforme*, and *Elyonurus argenteus* are important components. Each year approximately one half to three-fourths is burned from the frost period when the grass is dried (May or June) until the rains begin in November or December.

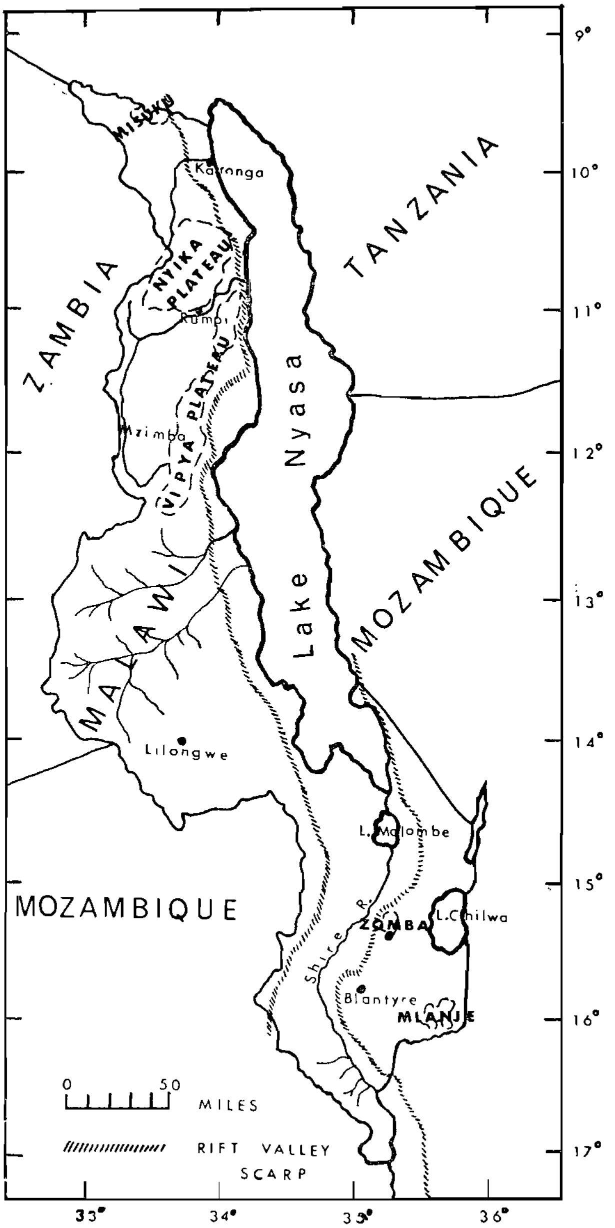

Fig. 1. Map of Malawi showing the location of the Nyika Plateau and other prominent plateaux of the country. Adapted from Brass (1953).

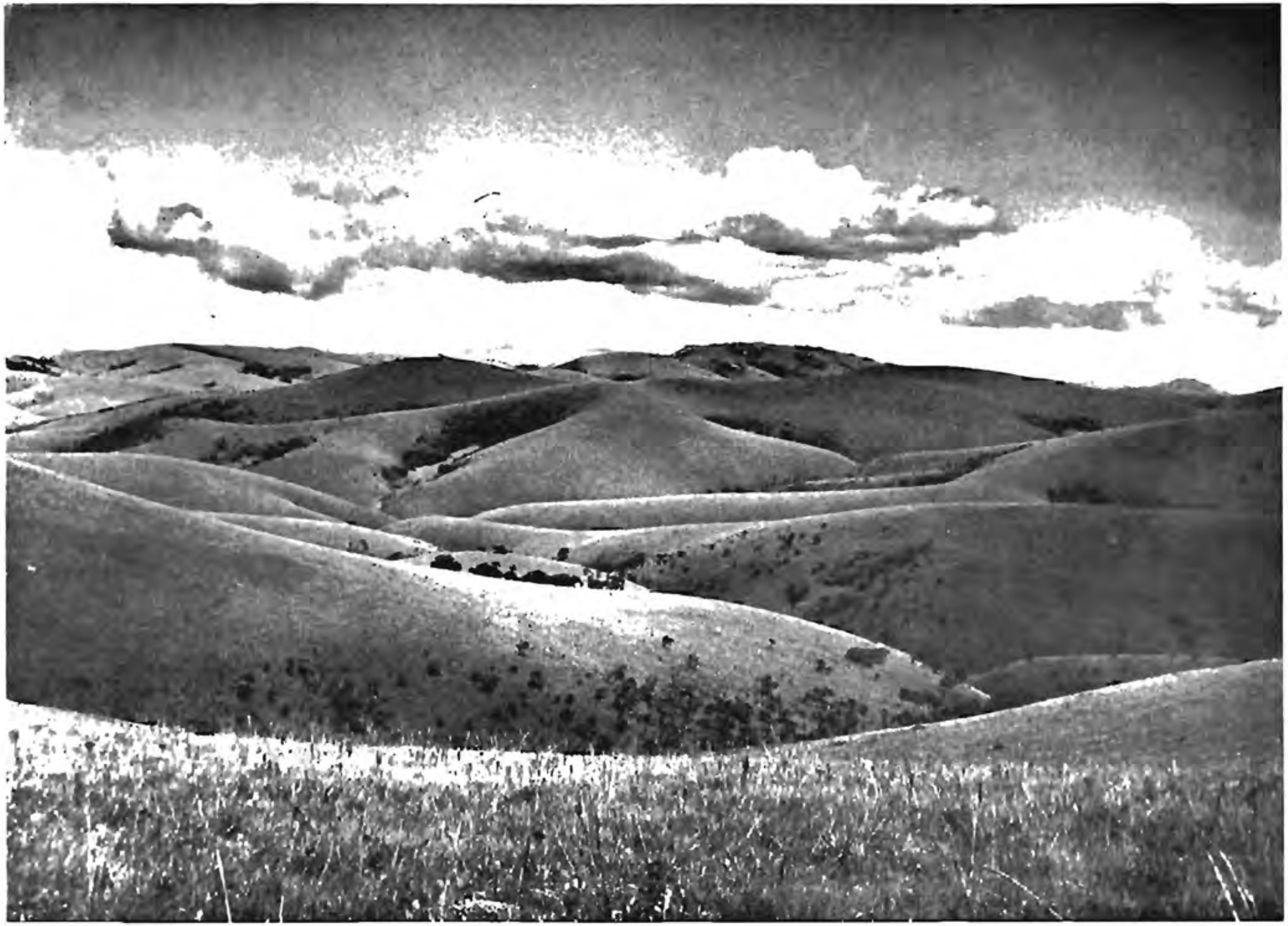

Fig. 2. A view of the central portion of the Nyika Plateau grassland, looking northeast toward Nganda Mountain. Small wooded patches surround the heads of marshy ravines. Some rocky outcrops are scattered over the hill in the background.

Amphibians and reptiles found on the undulating grass-covered hills, far enough from water or trees to be considered a part of that community, are:

Rana fasciata fuelleborni—Long-toed Grass Frog.
Ptychadena porosissima—Grassland Ridged Frog.
Mabuya varia nyikae—Nyika Variable Skink.
Chamaesaura miopropus—Montane Snake-Lizard.
Duberria lutrix shirana—Shire Slug-eating Snake.
Psammophylax tritaeniatus variabilis—Montane Grass Snake.

The dambo (Fig. 3). This is the second most extensive habitat-type on the plateau. Almost every open hollow has marshy, poorly-drained acid bog-like bottoms which are permanently wet; in the rainy seasons these become marshes with many small pools and rivulets. Such areas support the greatest numbers of amphibians and reptiles.

Some species may be restricted to the dambos, not because of water requirements, but because these areas escape burning. Fire on the grassland may have eliminated several species from that habitat. Since fires have undoubtedly occurred on the Nyika for many centuries (thunderstorms and poachers may both be responsible), they may have played an important part in evolution of some species; at least they are a factor in distribution. Only those species hibernating during the time of fires, or living in protected places, can escape.

Dambos form the head of a drainage or occur along the margins of streams. These may have tall weeds (giant lobelias are prominent); bracken (*Pteridium aquilinum*), iris (*Moraea*), many orchids, rank grasses, or deep tussocks of sedges and clumps of rushes. Heaths (*Blaeria patula*, *B. kiwuensis*) or heathlike shrubs (*Philippia benguelensis*) form a dense growth along streams or around ponds. In the area of the tussocks there are two major levels: the top, and a maze of tunnels underneath the fallen stems. Tops of clumps are often two to three feet above the moist ground below. It is difficult to locate animals in such a place unless they are on top of the tussocks. Runways made by rodents (e.g. *Lophuromys flavopunctatus*, *Otomys* spp.) may be utilized by some amphibians and reptiles.

Amphibians and reptiles found in the dambos include the following:
Bufo taitanus nyikae—Nyika Dwarf Toad.
Rana fasciata fuelleborni—Long-toed Grass Frog.
Ptychadena porosissima—Grassland Ridged Frog.
Ptychadena uzungwensis—Uzungwe Ridged Frog.
Phrynobatrachus ukingensis mababiensis—Common Cricket Frog.
Arthroleptis xenodactyloides nyikae—Nyika Squeaker.
Hyperolius pictus—Variable Montane Sedge Frog.
Hyperolius nasutus nasutus—Long Reed Frog.
Hyperolius mertensi—Black-striped Sedge Frog.
Chamaeleo goetzei nyikae—Nyika Pigmy Chameleon.
Chamaesaura miopropus—Montane Snake-Lizard.
Psammophylax tritaeniatus variabilis—Montane Grass Snake.

Of these, *P. ukingensis mababiensis* is surely the most abundant vertebrate on the Nyika. It is always found in the dambos and may be heard calling any time during the

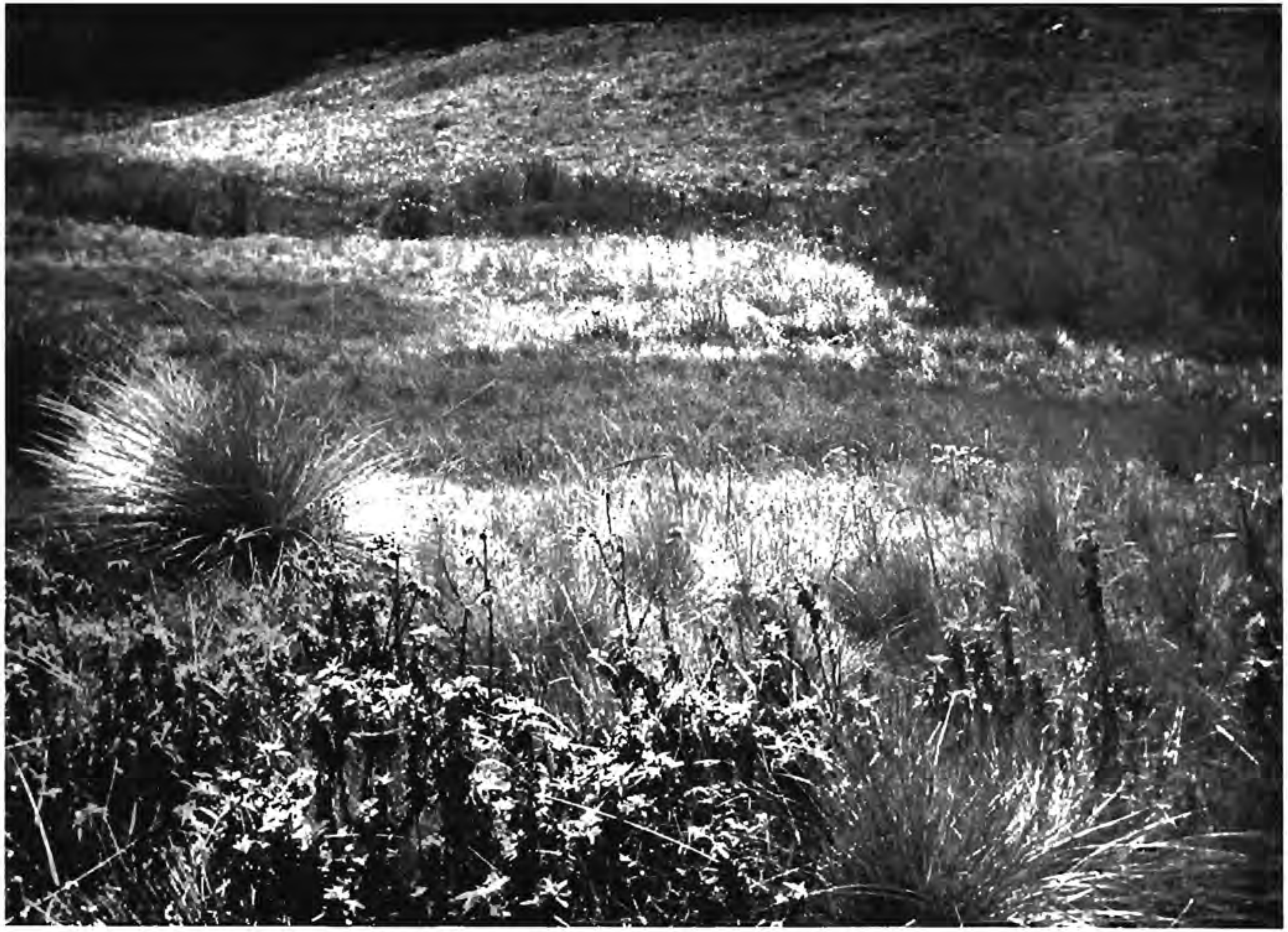

Fig. 3. A dambo (marsh) beside the Chelinda-Rumpi stream near its origin in the Chelinda forestry depot. The area of short grass, in the center of the photograph, is flooded during the rains. Shrubby heaths border the stream and close over the water. Large tussocks of harsh sedges, such as those in the foreground, are typical of moist hollows on the plateau. A planted *Pinus patula* stand is in the background.

day or night from November to May. The *Hyperolius* species are found only along streams or in very wet places. *Ptychadena porosissima* and *R. fasciata fuelleborni* come to the dambos to breed, then disperse widely over the grassland (as much as a quarter to a half mile from water).

The stream. Streams, or continually running water, vary in size from small drainage ditches to the Chelinda-Rumpi, the North Rukuru, and the North Rumpi Rivers which are sizeable fast-flowing rivers, especially during the rains. These show much seasonal variation in size. Streams become completely overgrown with heather so that they are hidden by shrub growth which may reach 6-8 feet above the banks (Fig. 3). Where the waterways widen to rivers, large shrubs and evergreen trees line the banks in many areas. *R. angolensis* is almost always found along running water. We have never found it more than a few feet from the stream edge. We have taken *Hyperolius pictus* from the heather 3-4 feet above the water.

The evergreen forest. Numerous evergreen patches are scattered over the Nyika. Now they are restricted primarily to the hollows, few extending to the tops of the hills. Some are virtually rain forests, dripping with water and lichens, dark, with their floors relatively clear of living vegetation except at the edges of the wooded patches or in small clearings. Many plant species are present in these "old" forests. Frequent dominants are *Podocarpus milanjianus*, *Kiggelaria africana*, *Diospyros whyteana*, *Olinia africana*. Epiphytes, lianas, lichens, mosses and ferns including the tree fern, *Cyathea deckenii*, are abundant. The forest floor is covered with dead leaves, fallen vines and rotting tree trunks. Springs give rise to small, clear, sandy-bottom streams with steep sides.

A surprise to us was the paucity of amphibians in what seemed a perfect habitat. We spent many hours examining these areas, but found only a few amphibians and no reptiles. There was a marked absence of insects as well. In comparison to the Nyika forests, a small evergreen patch on the Vipya Plateau (Chikangawa) at about 5,900 feet yielded, in two hours, 12 frogs (*Arthroleptis x. xenodactyloides* and *A. stenodactylus*). Small black crickets, the food of *Arthroleptis*, were abundant on that forest floor. Elevation, hence temperature, may be important in determining the presence of frogs in these high montane forests (Loveridge, 1953b).

The pine plantations around Chelinda Forest Depot were examined to see if species had invaded a recently changed environment. The first plantings were made in 1951. Except for a *Duberria lutrix*, the Slug-eating Snake, which was found just inside the edge of the forest, no herpetofauna was found.

We expected to find caecilians, but we did not. Loveridge (1953b) found *Scolecomorphus kirki* in the Shire Highlands of southern Malawi, the most southern record for caecilians. If they are in the southern region, they would be expected in the northern highlands as well.

Amphibians and reptiles found in the montane evergreen forests, but near forest borders, were:

Rana angolensis—Dusky-throated Frog.
Arthroleptis xenodactyloides nyikae—Nyika Squeaker.
Atheris nitschei rungweensis—Rungwe Bush Viper.

The forest margin. Such a transition zone is often a favoured habitat for many species. On the Nyika each forest patch is ringed by a firebreak where all grass has been removed from a two-yard strip. Controlled burning is done outside these firebreaks where thickets of a variety of plants develop, such as species of *Rubus*, *Protea*, *Hagenia* and *Pteridium*. The clearing makes viewing reptiles particularly easy.

In or along these firebreaks we found the following reptiles:

Lygodactylus angularis angularis—Angle-throated Gecko.
Chamaeleo goetzei nyikae—Nyika Pigmy Chameleon.
Mabuya varia nyikae—Nyika Variable Skink.
Python sebae—African Python.
Pseudaspis cana—Mole Snake.
Duberria lutrix shirana—Shire Slug-eating Snake.
Rhamphiophis oxyrhynchus rostratus—Beaked Snake.

Ponds. A few small ponds exist on the Nyika. Lake Kaulime (7,500 feet), near Chelinda, is the best known; it covers 4-5 acres and contains water the entire year. A 7-acre reservoir was completed at Chelinda early in 1964 and two others are under construction. These vary in size seasonally, but always have water. They are surrounded or fed by dambos. Amphibians found directly associated with these ponds are:

Xenopus laevis laevis—Upland Clawed Frog.
Rana angolensis—Dusky-throated Frog.

Any of the dambo-dwelling species may be encountered around the edges of ponds where there is wet ground. Since such species use the ponds as breeding places, various kinds of tadpoles are prevalent in them. There are a number of smaller temporary ponds over the plateau. During the rains they are used as breeding places by *Phrynobatrachus u. mababiensis*, *Rana f. fuelleborni*, *Ptychadena uzungwensis*, *P. porosissima* and possibly others.

Rocky outcrops (Fig. 4). Around the margin of the plateau and at the edge of the grassland are numerous granitic outcrops formed into rounded boulders covered with lichens. Near the edge of the plateau rocky areas are often surrounded with thickets of *Philippia* and other tall shrubs. *Protea* is dominant throughout these peripheral areas. Rocky outcrops occur on the plateau where rivers have cut steep ravines; they also form the crests of small hills. Some of these hills are named (e.g., Chosi Hill and Chowo Rock) and serve as points of recognition. Rock is not abundant on the plateau proper, and where outcrops occur, they are surrounded by deep soil. Talus or exfoliating rock is rarely present although crevices and refuges are created among clusters of small rounded rocks.

Reptiles found directly associated with these outcrops are:
Mabuya varia varia—Savanna Variable Skink.
Mabuya varia nyikae—Nyika Variable Skink.
Mabuya striata striata—Two-striped Skink.
Mabuya hildae—Hilda's Skink.

Brachystegia slopes. Dry scrub woodland surrounds the grassland. Where the grassland meets these woods, there are frequent rocky outcrops as described above. We mention this area because many of the species, especially reptiles, previously recorded from the

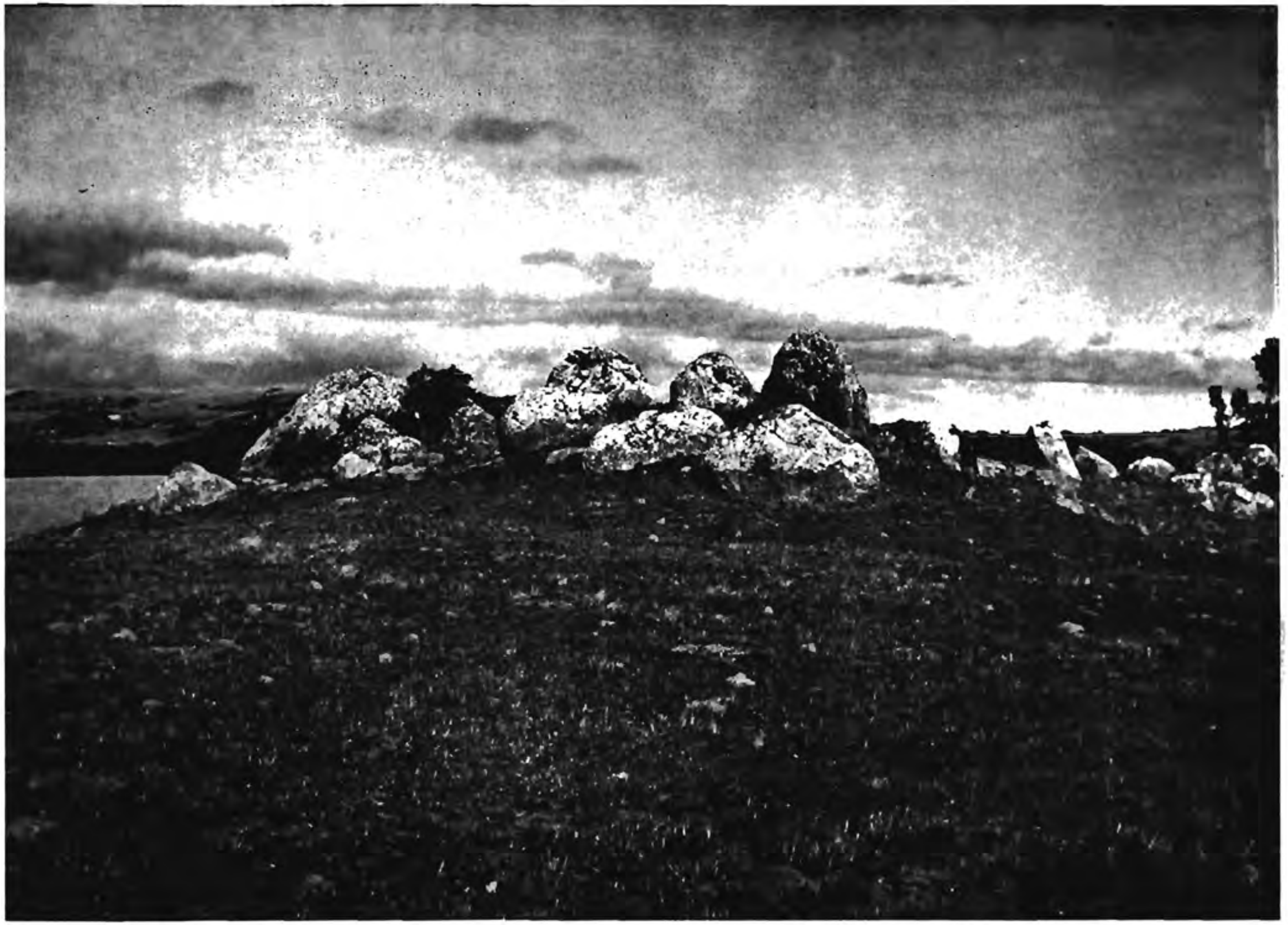

Fig. 4. An outcrop of lichen-covered granitic boulders by the Chelinda road, about three miles east of the Zambian Government Rest House. Two men, right of centre, are dwarfed by the rocks. Light spots among burned stubble in the foreground are termite mounds.

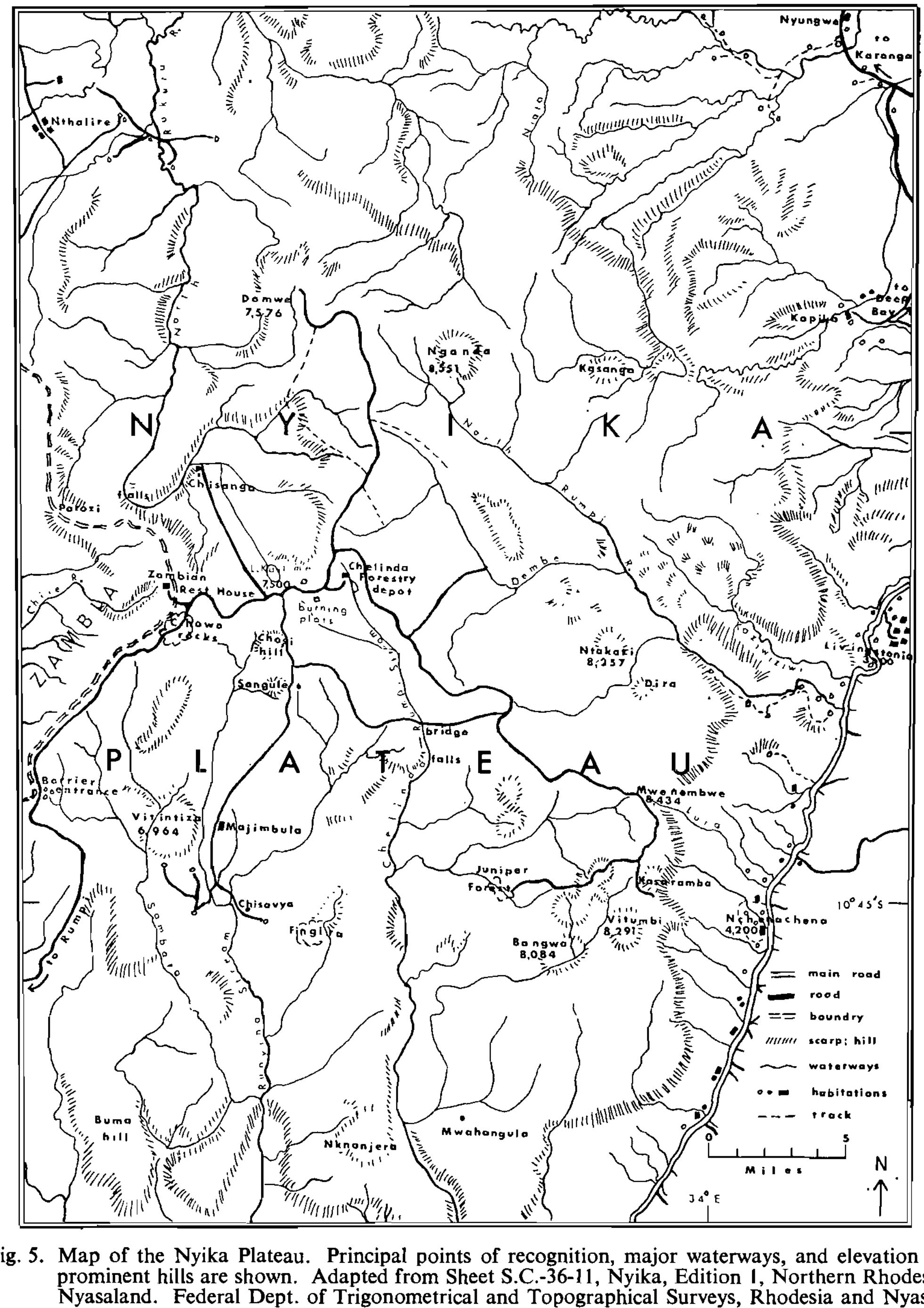

Fig. 5. Map of the Nyika Plateau. Principal points of recognition, major waterways, and elevation of prominent hills are shown. Adapted from Sheet S.C.-36-11, Nyika, Edition 1, Northern Rhodesia Nyasaland. Federal Dept. of Trigonometrical and Topographical Surveys, Rhodesia and Nyasaland. Salisbury. 1962.

Nyika, most assuredly came from lower down the slopes rather than from the Nyika proper. *Uapaca kirkiana* is dominant at higher elevations with *Brachystegia* becoming dominant further down the slopes. In ecological discussions one should not include these surrounding areas as a part of the plateau proper for the ecological conditions there are quite different.

Species encountered high on the *Uapaca-Brachystegia* slopes (5,000-6,000 feet) are:

Bufo pusillus—Flat-backed Toad.
Bufo regularis—Square-marked Toad.
Ptychadena oxyrhynchus—Sharp-nosed Ridged Frog.
Arthroleptis x. xenodactyloides—Dwarf Squeaker.
Arthroleptis x. nyikae—Nyika Squeaker.
Hyperolius marmoratus marginatus—Margined Sedge Frog.
Dispholidus typus—Boomslang.

SPECIES ACCOUNTS

Pertinent observations made on Nyika species follow. Collection sites mentioned are shown on the detailed map of the plateau (Fig. 5). When available, data include locality, date of collection, numbers, sex, and snout-vent length in millimeters. For reptiles, measurements given are total length, snout-vent length and tail length, in that order.

Part I. Amphibians

Family PIPIDAE

Xenopus laevis laevis (Daudin). Upland Clawed Frog.

Chelinda reservoir	Dec. 12, 1963	8 adults	86—94 mm.
Chelinda reservoir	Dec. 30, 1963	tadpoles; abundant	10—23·8 „ (27—77 mm. total)
Lake Kaulime	Jan. 26, 1964	female, imm.	44.6 mm.

These are the first records of the species from northern Malawi.

Since there are relatively few ponds on the plateau, these frogs must live in the streams and temporary pools in the dambos. Adults and larvae of all sizes were found to be abundant in the newly constructed reservoir at the Chelinda depot in December. Construction began in September and the dam was closed in early November so that water accumulated from that time. Were the adults permanently in the Chelinda-Rumpi stream (in this area a fast-flowing stream, 3-5 feet wide, 2-4 feet deep), hibernating in the dambo, or did they migrate to appear in large numbers when the water became deep? Neither larvae nor adults were seen again, although they may have gone to the depths of the rapidly enlarging reservoir.

Family BUFONIDAE

Bufo regularis Reuss. Square-marked Toad.

There are no definite records of this species from the plateau proper. There are two specimens in the British Museum from Sir Harry Johnston's collection which are labelled

"Nyika Plateau". One (97.6.9.231) appears to be *B. garmani* Meek. Since there have been no other records from the plateau, those specimens may have been collected on the lower slopes where one would expect to find *B. regularis.*

Bufo pusillus Mertens. Flat-backed Toad.

East slope of the Nyika above Nchenachena.	Jan. 2, 1964	immature	34 mm.

This species has not been found on the plateau proper, but does occur on the slopes and in peripheral areas (Nchenachena, Rumpi).

The specimen was taken by Pine Plot No. 1, by the trail to Nchenachena from Kasaramba. It was very dark with distinct, regular, black spots and a gold vertebral stripe. It was almost the same color as the black soil.

Bufo taitanus nyikae Loveridge. Nyika Dwarf Toad.

Zambian Rest House	Dec. 10, 11, 1963	several	
Chelinda depot	Jan. 27, 1964	female	39·3 mm.
,, ,,	Feb. 17, 1964	female	33·5 ,,
,, ,,	Feb. 17, 1964	male	33·2 ,,
,, ,,	April 5, 1964	female	38·5 ,,

Abundance. These small toads must be relatively rare, or else have short activity periods.

Breeding activity. Breeding seems to occur throughout the rainy season. Loveridge (1953b) found pairs in amplexus in mid-November. On February 17, 1964, Stewart found eggs in a tiny pool in the Chelinda dambo. A pair in captivity began amplexus and the female deposited 125 eggs during the night.

Larval development. Egg and larval development was followed until all tadpoles died when the forelimbs were emerging 20 days following egg deposition. Details of development will be covered in a separate publication.

Family RANIDAE

Rana angolensis Bocage. Dusky-throated Frog.

Zambian Rest House, stream	Aug. 18, 1963		
Chelinda stream	Nov. 7, 1963	female	68 mm.
Chelinda spring	Nov. 20, 1963	7 males	49—54 ,,
		2 females	64·5—72·5 ,,
		female, imm.	42 ,,
Chelinda stream	Dec. 12, 1963	female, imm.	50 ,,
,, ,,	Jan. 1, 1964	male, imm.	50·5 ,,
Chelinda reservoir	Jan. 7, 1964	6 tadpoles	23·5—25·9 ,, (63—67 total)
,, ,,	Jan. 7, 1964	transforming	26·8 mm.
,, ,,		4 males	50—58·2 ,,
		female	55 ,,
,, ,,	Jan. 29, 1964	3 females	74·5—78·5 ,,
		males	46·7—47·2 ,,
		imm.	28—44 ,,

Abundance and habitat preference. It is likely that this species occurs in every stream on the plateau. It is very common along the Chelinda-Rumpi where one frog may be flushed about every 1-3 yards of stream bank. Since it is so common, specimens were not taken at each locality where it was seen. Observations were also made at Chelinda Bridge, on the Chelinda-Rumpi stream; North Rukuru River; Lake Kaulime; Runyina Stream, near Majimbula; and Sambara Stream near Vitintiza. Several were found in a small stream in an evergreen forest patch about 10 yards from the outside of the forest (with *Arthroleptis xenodactyloides nyikae*). Evidently they will live in deep shade as well as open situations. Although *R. angolensis* is found primarily in open country, it has been reported from forests (Schmidt and Inger, 1959).

Seasonal activity. This species was observed throughout the year.

Calling. For such a large frog, its call is inconspicuous. The call has much variety and may be heard any time during the day or night. There is most frequently a long series of "tick-tick-tick-tick-tick-tick" followed by a louder "chip," then various grunts, groans, low hoarse guttural sounds or a low "waak." The frogs hang suspended in water, snout and eyes out, resting against the bank or vegetation as they call. Calling was heard from January through June, but probably continues throughout the year.

Larvae. Tadpoles of all sizes were everpresent in ditches, ponds, streams. They show variation as do their parents. Some are gray and black blotched; others are almost black. The mid-dorsal stripe is apparent when tadpoles have large hind legs.

Color variation. Color and pattern are variable in the Nyika populations as elsewhere. Nyika specimens are most frequently dark spotted with or without a broad, gold, vertebral band. The band is present in greater frequency (24 of 40 tabulated) in Nyika individuals than in other populations observed. Specimens with faint markings and a greenish hue are seen together with other variants. Nyika individuals are much darker and the pattern more distinct than in those observed elsewhere (Rumpi, Nchenachena, Livingstonia, Mzimba, Chikangawa, Zomba, Likabula).

Rana fasciata fuelleborni Nieden. Long-toed Grass Frog.

Chelinda dambo	Nov. 20, 1963	female, gravid	48 mm.
		juvenile	19 „
Zambian Nyika	Dec. 10, 1963		
Chelinda dambo	Dec. 12, 1963	male	38 „
Kaulime, wet hillside	Jan. 27, 1964	female, gravid	44·5 „
		5 males	34·6—40 „
Chelinda dambo	Jan. 29, 1964	2 females	50—53 „
		2 males	35·2—36·1 „
Chelinda, grassy ridge	Jan. 30, 1964	male	32 „
Manyanyesi Stream	Jan. 31, 1964	female, gravid	49·1 „
Chelinda mudflow	Feb. 1, 1964	tadpoles	19—19·7 „ (49—50 mm. total)
Chelinda, grassy ridge	Feb. 15, 1964	female, gravid	46·2 „
Chelinda dambo	Mar. 8, 1964	male	37·2 „
		juvenile	20 „
Chelinda, grassy ridge	Mar. 22, 1964	female, spent	40·2 „
Nganda	Apr. 25, 1964		
Burning plots near Chelinda	Apr. 22, 1964		
Kaulime, dambo	May 28, 1964		
Chelinda, dambo	June 1-8, 1964	all sizes	
Nganda, grassy ridge	July 4, 1964	female, spent	
Buma Hill; Chelinda Bridge			

Abundance and habitat preference. These frogs are common on the plateau. They are widespread over the grasslands far from water except when breeding. We have found them in dry grass on hilltops hundreds of yards from water sources, or under loose slabs of rock about one-half mile from water except for rainwater on the rocks. They sit underneath leaves or fallen grass blades but jump far when disturbed, covering 2-3 yards in a single leap. In deep sedges they evade capture by quickly and quietly burrowing into grass head first; the sharp, slender snout and narrow body seem well adapted to such behavior.

Seasonal activity. Adults were collected each month except August, September and October. They may be active throughout the year.

Calling. The call is a loud musical "put—put-put—put-put—put" which is often repeated so rapidly as to become a twitter. Adults call from underneath overhanging vegetation around wet areas. They are usually heard in chorus, their melodic calls filling the dambos during the rainy season, day or night, the intensity increasing at night. Theirs is the most common call heard during February and March. Calls almost stopped when night temperatures reached a minimum of 48°F in late April. Calling resumed during the warmer parts of the day or on warmer nights. Calls were heard from October through June; however, the frogs probably call throughout the year.

Breeding activity. Adults move into the dambos for breeding and are seen there in abundance. In late January pairs went into amplexus in captivity and females deposited eggs.

Eggs and larvae. Many clusters of eggs were found in the field from mid-February to mid-March. Egg masses were found on moist soil or vegetation an inch or more above the water underneath overhanging mats of sedges. From this position tadpoles could easily fall or wiggle into the water when hatched. Eggs were in loosely adhering clusters of 1-14; some were single or in small groups around the periphery of the main cluster, each group adhering to sedge blades or the earth. Eggs, enclosed in a very tough, almost leathery transparent membrane, separated easily when disturbed. Empty capsules were found weeks after larvae had emerged. Rose (1962) reports similar egg-laying habits for *Rana grayi* and for *R. fasciata* of South Africa. Tadpoles were metamorphosing in late March and early February, but these seemed too large to have developed within one season. It seems to take at least a year for tadpoles to complete their development although time may be lessened in areas where water sources are unstable.

Early development was followed from eggs obtained in the field (Stewart, unpublished).

Color variation. Pattern seems constant, but the color can vary from almost ebony brown with an orange-pink broad mid-dorsal band, to very pale flesh with a light mid-dorsal band. In the light phase, the dorsolateral ridges are distinctly black against a light background. Colors are dark during the day in the open; colors lighten markedly in protected places and at night.

Ptychadena porosissima (Steindachner). Grassland Ridged Frog.

Zambian Nyika	Dec. 11, 1963	1 specimen	
Chelinda depot	Dec. 12, 1963	2 females, gravid	49—51 mm.
,, ,,	Dec. 12, 1963	2 males	41—44 ,,
,, ,,	Jan. 7, 1964	male	41 ,,
,, ,,	Jan. 29, 1964	female	50 ,,
,, ,,	Jan. 27, 1964	recent trans.	
,, ,,	Feb. 18, 1964	2 males	36—46·2 ,,
		recent trans.	22 ,,
Chosi Beacon, road	Mar. 7, 1964	transforming	12—14·9 ,,
Chelinda, grassy hill	Mar. 22, 1964	juvenile	24 ,,
Chelinda depot	Apr. 6, 1964	female, gravid	52 ,,
Chelinda depot	June 11, 1964	juvenile	

This species has not been collected before in Malawi.

Abundance and habitat preference. These frogs are common, but are seen less frequently than *Rana fasciata.* Like *Rana fasciata, P. porosissima* is a grassland form occurring long distances from water. We have found it as much as 600 yards from water in dry grass on the sides or tops of grassy ridges. Like *R. fasciata,* it uses puddles or drainage pools for breeding sites. But, differing from a true *Rana,* when disturbed near water, it retreats to the grass, heading away from rather than into the water.

Breeding activity. Evidence indicates that December is the height of breeding with young dispersing widely from breeding sites (small pools or large ponds) in April.

Larvae. On March 7, on the road near Chosi Beacon, Stewart found masses of dead tadpoles of this species in a large puddle. Some were transforming; others had hind legs only. Perhaps they had been injured by passing vehicles. On January 27, she found recently transformed individuals by small drainage pools on the marshy hillside above Lake Kaulime. During April young frogs were found in the grass at considerable distances from water. They seemed to be dispersing from hatching sites and moving into dryer situations. Since rains were much less frequent then, the grass and ground was very dry during the day, moistened primarily by mists at night.

Color variation. Color shows little variation. Variation of pattern is expressed primarily in the presence or absence of a broad light vertebral line. The line may be reduced to a hairline or absent. A fine white longitudinal line is present along the center of the knee, continuing along the mid-tibia, ankle, to the outer margin of the foot. This distinguishes the species from *P. uzungwensis,* also present on the plateau.

Ptychadena uzungwensis (Loveridge). Uzungwe Ridged Frog.

Chelinda Depot	Feb. 18, 1964	adult male	36·2 mm.

This is the only record of the species on the plateau, although it has been taken from surrounding areas and from Livingstonia on the eastern edge of the plateau.

Variation. This specimen was quite different from others collected in northern Malawi. Spots on the back tended to coalesce into horizontal black bars, and bands on the legs were more numerous. There were 8-9 bands on the femur, eight on the tibia and eight on the foot. Poynton (1964a) has described a similar variant for *P. porosissima* which seems to be closely related. It would be of interest to know whether hybridization between the two species occurs on the plateau where they are sympatric.

Behavior. The individual, when captured, displayed behavior different from other *Ptychadena.* It resisted by bowing its body, which it puffed out considerably, stiffening

Phrynobatrachus ukingensis mababiensis FitzSimons. Common Cricket Frog.

Kaulime Pond, margin	Nov. 6, 1963		
Zambian Rest House, stream	Dec. 11, 1963		18·5 mm.
Chelinda depot	Jan. 7, 1964	female, gravid	17·8 ,,
,, ,,	Jan. 30, 1964	8 females	16·4—18·8 ,,
,, ,,	Jan. 30, 1964	juvenile	13 ,,
,, ,,	Jan. 30, 1964	6 males	15·2—17 ,,
,, ,,	Feb. 14, 1964	juvenile	9·8 ,,
Chelinda Bridge	Mar. 7, 1964	male	15·8 ,,
Chelinda reservoir	Mar. 8, 1964	female	22·0 ,,
,, ,,	Mar. 9, 1964	2 females	17—17·8 ,,
,, ,,	Mar. 9, 1964	2 males	16·1—16·8 ,,
Lake Kaulime	Apr. 28, 1964	juveniles	
Chelinda depot	June 1-11, 1964	juveniles	

and straightening the hind legs and squeaking. The light gular sacs were extended slightly as it squeaked.

Other areas where specimens were observed but not measured were in dambos by the North Rumpi River, Chelinda Falls, streams near Majimbula village, and by the stream at the Juniper Forest.

Taxonomy. Loveridge (1953b) created a new subspecies for the Nyika cricket frogs (*P. u. nyikae*) separating them from those occurring at lower elevations on the basis of darker pigmentation, and on shorter hind limbs as determined by the point reached by the tibio-tarsal junction of the adpressed hind limb. This second character is usually true of gravid females, but in many spent females and males the tibio-tarsal articulation reaches points from the front of the arm to mid-eye, usually reaching the posterior margin of the eye. This is therefore not a reliable measurement. It differs in fresh and preserved material and can vary with the way the frog is held. The color is, however, generally darker than that of the lowland frogs and the throat of the males is blacker. But here again the characters do not seem constant enough to reliably separate animals of unknown origin. Calls, behavior, and habitat, so far as we have observed, are similar. We do not find a valid distinction between these two frogs.

Specimens which Stewart collected at Livingstonia (3,500 feet) and from Chikangawa (5,900 feet) on the Vipya Plateau were not distinguishable as to subspecies. Poynton (1964b) stressed the wide variation present in *P. u. mababiensis* and included the Nyika frogs in that subspecies.

Abundance and habitat preference. Cricket frogs abound in the dambos. One or more jump aside as a foot is placed in the boggy bottoms.

Short hops in different directions as well as quick burrowing into the dense sedges help these tiny frogs to escape. If they jump into the water, they swim out quickly as if water were unpleasant to them. They usually sit at the edges of marshy pools, on the wet sedges, or under overhanging vegetation.

Seasonal activity. We have found these frogs active throughout our observation period.

Calling. The call is a soft cricket-like trill of about four seconds duration, repeated after about two seconds; calling continues for a long time. Trills may be followed by a short "chip" or interspersed with twitters, soft "chee-chee-chee" calls. The call is elusive, almost ventriloqual; it is hard to find the male with the inflated vocal sac. Males were observed calling in the immediate vicinity of females. Calling may be heard any time of the day or night during the wet season, less frequently at other times. Calls were very soft and rarely heard during late April. However, as late as April 25, a pair was found in amplexus and another male was calling a few inches away.

Eggs and metamorphosis. Despite the abundance of frogs, eggs were never found in the field. They probably drop to the bottom of tiny pools in depressions between sedge tussocks where they sink into detritus and are hidden. Recently metamorphosed froglets were abundant in the drying dambos from April through June.

Color variation. As with other species of *Phrynobatrachus*, there is considerable pattern variation. Of 68 specimens tabulated, 50% were dark; 40% had a light vertebral hairline which continued along the hind leg in some frogs; 9% had a broad chestnut band from the snout, over the eyes, narrowing slightly but continuing to the end of the urostyle. Skin within the band is smooth whereas in fuscous individuals it is warty. Patterns seem to be evenly distributed between the sexes. The dark dorsal color is a very effective camouflage against the black Nyika soil. Similar pattern variation has been noted in *P. natalensis* and *P. acridoides*.

Arthroleptis xenodactyloides nyikae Loveridge. Nyika Squeaker

Chelinda-Rumpi dambo	Jan. 3, 1964	2 males	17 mm.; 17·6 mm.
Evergreen forests, west Nyika	Apr. 22, 1964	3 imm.	13·8; 14·1; 14·6 ,,
Montane forest, Zambia	Dec. 10, 1963		
Grassland, near forest edge, Zambia	Dec. 11, 1963		

Abundance and habitat preference. These frogs are rarely encountered. Several evergreen patches, where one would expect to find them, were examined thoroughly, but no frogs were found. Two were found in the grass near the Chelinda-Rumpi stream far from any forest. About 300 yards from the stream were the extensive planted pine plantations, but there were no native evergreen patches for about two miles.

In forest patches near the access road, 7·5 miles west of Chelinda depot, three immatures were found. Two were in a tiny stream in one forest; the other was on the steep bank of a stream in another wood about a mile away.

Color variation. Color of individuals varies from light beige to brick red; the dorsal "hour-glass" pattern is distinct on immatures but faint on the large males. Males have extremely elongated third fingers (5, 5·9 mm.) which are 29·4% and 33·5% of the snout-vent length or three times the length of the fourth finger. Two larger (19·5, 22·5 mm., s.v.l.) males were found on a damp *Uapaca-Brachystegia* slope above Nchenachena; their third fingers were 8·5 and 9 mm. long, or 47·7% and 40% of snout-vent lengths.

None of these specimens shows the striking black marbled abdomen of Loveridge's type material. Males in his collection do not show the extremely elongated third finger as the length of that finger seems to increase with age.

Hyperolius pictus Ahl. Variable Montane Sedge Frog

Chelinda dambo	Nov. 20, 1963		
Zambian Nyika	Dec. 10, 11, 1963	19 males	23—27 mm.
Chelinda dambo	Dec. 12, 1963	4 females, gravid	31·6—35 ,,
Chelinda dambo	Dec. 30, 1963	3 females	29·5—34·0 ,,
		3 males	24—27·9 ,,
Lake Kaulime	Jan. 27, 1964	male, calling	
Chelinda dambo	Jan. 31, 1964	laying eggs	
,, ,,	Feb. 3, 1964	laying eggs	
,, ,,	Feb. 3, 1964	4 males	23·5—27·8 ,,
,, ,,	Feb. 3, 1964	17 females	26·7—34·3 ,,
Chelinda Bridge	Mar. 7, 1964	female	36·0 ,,
Chelinda dambo	Apr. 5, 1964	transforming	10·5—11 ,,
,, ,,	Apr. 20, 1964	laying eggs	
,, ,,	Apr. 26, 1964	transforming	10—11 ,,
		female, gravid	32 ,,
		female, immature	23 ,,
		male	27 ,,
,, ,,	Apr. 27, 1964	3 males, calling	22·2—22·5 ,,
Lake Kaulime	May 28, 1964	recent met.	14—15 ,,
		male, immature	21·5—23 ,,
Chelinda dambo	June 10, 1964	transforming	9 ,,
Chelinda dambo	June 26, 1964	2 recent met.	12—15 ,,

Abundance and habitat preference. This species (incorrectly identified as *Hyperolius marginatus* Peters by Loveridge, 1953b) is one of the most common amphibians of the Nyika dambos. During the height of the breeding season (December—February) it is found in large numbers in wet areas. During the day individuals are on vegetation around small pools, ponds, or streams. We collected them 3-4 feet above water on the shrubby heaths lining the stream. We have never taken them far from water, usually no more than 3-5 yards from water. The immediate site—blade of sedge, leaf, twig—may be dry, at least during the day.

These frogs are slow-moving and easily captured; they fall into the water to escape capture, but soon emerge to grasp another stem.

Seasonal activity. Adults were rarely seen during April. Only juveniles were seen after May. Adults seem to hibernate during the cold, dry months, then emerge during November when breeding activity begins.

Calling. The call is a gutteral, harsh, low "creeak" repeated at intervals of 20-60 seconds or longer. The individual call is sometimes prolonged into a trill. Calls resemble those of the associated *H. mertensi* and *H. nasutus*, but are louder and not so hoarse and creaky. It is especially difficult to distinguish calls of *H. pictus* and *H. mertensi.* Calling begins in late afternoon or at dusk. The frogs may be heard throughout the dambo. They do not form choruses but the call of one seems to be answered by another several yards away. Males may call from emergent vegetation in the water or from vegetation near the water. Calling decreased with the advent of cold nights. Calls were heard until May 28 at Chelinda (air temperature, 52°F).

Eggs and larvae. Eggs are deposited in flattened gelatinous masses on vegetation just above or at the edge of water. Larvae are flooded into pools with rising water, or wiggle out of the liquifying mass into surrounding water. Similar habits are found in *Hyperolius tuberilinguis*, a lowland species. Details of early development are being described by Stewart (unpublished).

Pattern development. Observations of individuals from late larval stages through adulthood show that there is a sequential development of color and pattern. Newly transformed froglets are gray-brown with three bright green stripes down the back. These become pale, then silver, and eventually fade. The back becomes beige or pale gray with a silvery or white lateral band. Dorsal stripes are barely visible. Individuals of 21-23 mm. snout-vent length, are almost uniform in color—beige or lichen green. Larger individuals show development of the spots, stripes, or green, brown, or gray colors of adults.

Color variation. This species shows tremendous variation of color and pattern. At least seven different recognizable color-pattern variants were noted. None was restricted to one sex. Five of the variants were well described by Loveridge (1953b).

Hyperolius nasutus nasutus Günther. Long Reed Frog.

Lake Kaulime	Nov. 3, 1963	female	17·5 mm.
Chelinda dambo	June 10, 1964	12 juv.	13—15 ,,
Chelinda dambo	June 26, 1964	female	21 ,,

These are the first collections of this species from the Nyika Plateau. It is usually found at lower elevations, but it was recorded at about 6,000 feet in the Albert National Park of the Congo (Laurent, 1950).

Abundance and habitat preference. Long Reed Frogs are apparently scarce on the Nyika. They were found in short sedges in wet areas. Perhaps they are not successful at such high elevations. Large populations occur in adjoining areas: the lakeshore (1,600 ft.) to the east of the plateau, Livingstonia (3,500 ft.) on the southeastern edge of the plateau, Vwaza Marsh (3,500 ft.) below the southwest margin of the plateau, and at Rumpi and Njakwa (3,000 ft.) south of the plateau (Stewart, unpublished).

Behavior. Behavior of recently emerged froglets is different from that of associated *Hyperolius* species on the plateau. Froglets climb to the top of a blade of grass or sedge and fold themselves along the length of the blade. Although they are the same color as the grass, they are seen more readily than young *H. pictus* and *H. mertensi* which tend to remain near the ground.

Hyperolius mertensi Poynton. Black-striped Sedge Frog

Lake Kaulime	Nov. 3, 1963	juvenile	13·8 mm.
Zambian Rest House	Dec. 10, 11, 1963	17 males	19·3—22·8 ,,
		female	24·7 ,,
Chelinda dambo	Dec. 12, 1963	5 males	20·6—22·2 ,,
		female	22·9 ,,
,, ,,	Jan. 7, 1964	2 males	20·5—21 ,,
,, ,,	Feb. 1, 1964	2 males	20—22 ,,
,, ,,	Feb. 20, 1964	3 males	22·1—24 ,,
		female, gravid	28·5 ,,
,, ,,	Mar. 7, 1964	male	22·8 ,,
,, ,,	Mar. 9, 1964	male	23·2 ,,
,, ,,	June 8, 1964	juvenile	
,, ,,	June 10, 1964	juvenile	14 ,,
,, ,,	June 25, 1964	trans.	9·5 ,,

This species has been collected only on the Nyika Plateau. It was described by Poynton (1964b) from specimens collected by Wilson on the Zambian Nyika.

Abundance and habitat preference. It is seen less frequently than the larger *H. pictus* but is apparently common in limited areas. Specimens were found in wet grass surrounding the rising reservoir at Chelinda, by the stream during the rains, and in the dambos. They were common on a very wet, heavily-grazed slope in front of the Chelinda staff house. Water collected in little depressions between sedge tussocks; these tiny pools were used for breeding. Since the grass was short, observation was simple.

There seemed to be a slight difference in habitat preferences of *H. mertensi* and *H. pictus*. *H. mertensi* males were found calling primarily around the tiny pools whereas *H. pictus* was found around larger areas of water, often on emergent vegetation surrounded by water. *H. nasutus* were in the immediate vicinity of *H. mertensi* but tended to climb higher on the sedge blades.

Seasonal activity. Since no adults were seen after March 9, they apparently hibernate with the advent of cooler weather, then emerge in November when the rains begin.

Calling. Calls were heard during February and March. Calls are similar to those of *H. nasutus* but are louder, more penetrating, gutteral and crisp. The single call is repeated at intervals of 8-20 seconds; it may occasionally continue into a trill. Males begin calling about 5.30 p.m., the calls increasing with approaching darkness. They call from distances of about five yards. Females were rarely found and were never found in the vicinity of calling males.

Eggs and larvae. A gravid female was collected on February 20, but eggs were not found. Tadpoles were metamorphosing in June. Newly transformed individuals resemble adults although the arrangement of stripes seems to change with age.

Sex ratio. Of 34 adults collected, three were females. A behavioral study of the two sexes would determine whether the apparent ratio is real or whether it is due to greater activity of the males.

Distinctive features. Hyperolius mertensi resembles most closely *H. nasutus.* They have a similar body shape, similar call and similar habitat preference. *H. mertensi* is recognized by black longitudinal stripes on the back and by pink toes and feet. The other sedge frogs on the Nyika have yellow feet.

Part II. Reptiles

Family GEKKONIDAE

Lygodactylus angularis angularis Günther. Angle-throated Gecko

Zambian Rest House	Dec. 28, 1963	common	
Near Chelinda-Rumpi bridge	Mar. 7, 1964	imm.	49 (28+ 21) mm.

Loveridge did not collect this species although it was recorded from the Nyika by Boulenger (1897).

Abundance and habitat preference. These geckos are common on the buildings at the Zambian rest house.

The single specimen was on the bole of a small tree in a very wet brushy niche beside a dripping boulder 200 yards from the Chelinda-Rumpi stream. Nearby were found *Rana fasciata, Hyperolius pictus* and *Phrynobatrachus ukingensis.*

Family CHAMAELEONIDAE

Chamaeleo goetzei nyikae Loveridge. Nyika Chameleon

Zambian Nyika	Aug. 15, 1963	6 specimens	
,, ,,	Dec. 11, 1963	4 ,,	
Chelinda depot	Feb. 18, 1964	imm.	55 (30 + 25) mm.

Abundance and habitat preference. These animals seem to be rare on the Malawi Nyika but common on the Zambian side. O. J. Carey reports having seen only one during his five years on the plateau. Loveridge (1953a) found only three on the eastern brow of the Nyika. The western side of the Nyika is lower and gets less rain than the eastern side. Zambian specimens were all taken from margins of montane evergreen forest patches. Loveridge's specimens were taken from a boggy depression and from a grassland path. The Chelinda individual was found at mid-morning on sodden earth, at the base of tall grasses, by a drainage area near the staff house. When found, it was bright apricot yellow, but turned almost black in the house. In the sunlight it became ashen or greenish gray. It squeaked audibly and opened its mouth when picked up.

Range extension. Recently Donald Broadley (1963) found this species on Mlanje Mountain in the southern region. His is the first record outside the Nyika Plateau.

Family SCINCIDAE

Mabuya varia varia (Peters). Savanna Variable Skink

Zambian Nyika .. .. Nov. 28, 1963

The single specimen was collected under a loose slab of rock. Broadley says (personal communication) this individual agrees with the typical form in having 32 midbody scale rows and five superciliary scales.

Mabuya varia nyikae Loveridge. Nyika Variable Skink

7 mi. w. of Chelinda	Oct. 13, 1963	female, gravid	122 (52 + 70) mm.
Near Forest Plot—7	Nov. 2, 1963	male	— (52 —) ,, tail regen.
Zambian Nyika	Nov. 28, 1963		
Chelinda depot	Feb. 16, 1964	female	101 (38 + 63) mm.
Burning Plot F	Apr. 26, 1964	male	107 (51 + 56) ,,

Taxonomy. Broadley (personal communication) has examined the series collected by Wilson on the Zambian Nyika; he says those specimens lack the plumbeous throat of the holotype taken by Loveridge (1953a) from the eastern plateau. The centre of the nostril is a little behind the rostral-labial suture; there are 4 superciliaries and 34-37 body scale rows. Toes of adpressed limbs overlap.

Abundance and habitat preference. These skinks are seen frequently near the edges of forests, crossing the road, on the open grassland, or under loose rock slabs on rocky outcrops. They move quietly over the top of the grass or through tussocks. Their movements are not fast but they usually evade capture by escaping into the grass.

Eggs. A female, collected October 13, 1963, contained four eggs, each 7 mm. in diameter.

Color. The head is brown, the rest of the body gray-brown with white lines. The lateral band is black subtended by a pure white line. The female has a blue-white chin and throat, greenish belly; the ventral tail is gray. The male has a bright orange-yellow venter, including legs; the chin is gray-white.

Parasites. Clusters of up to 15 red mites were found in the axillae of all individuals.

Mabuya striata striata (Peters). Two-striped Skink

Zambian Nyika .. .. Dec. 10, 1963 .. common

These skinks are common on all rocky outcrops on the Zambian side of the plateau. The species is ovoviviparous; females held three to six fetuses. All specimens had patches of red mites in each axilla.

Mabuya hildae Loveridge. Hilda's Skink

Zambian Nyika .. .. Dec. 10, 1963

Taxonomy. Seven individuals of a series of *Mabuya striata* collected on rocky outcrops on the western rim of the plateau agree with Loveridge's *M. hildae* (1953a). The subocular scales are excluded from the lip by the upper labials. Loveridge's nine specimens of *M. hildae* were collected on the eastern side of the plateau. A careful study of the Nyika skinks should be made to determine the extent of variation of the various forms and to determine whether this form should have species status.

Family CORDYLIDAE

Chamaesaura miopropus Boulenger. Montane Snake-Lizard

Burning Plots FK	Nov. 7, 1963	male	288 (67 + 221) mm.
Zambian Nyika	Nov. 27, 1963	female, preg.	365 (125 + 240) ,,
Zambian Rest House	Dec. 10, 1963	juvenile	145 ,,
Zambian Nyika	Dec. 10, 1963	4	
Near Majimbula	Feb. 1, 1964	imm.	240 (55·8 + 184·2) ,,
Foot of Nganda Mt.	May 28, 1964	female	506 (108 + 398) ,,
Chelinda grassland	July 3, 1964	female	368 (79 + 289) ,,
,, ,,	,, ,, ,,	,,	340 (69 + 271) ,,
,, ,,	,, ,, ,,	,,	360 (75 + 285) ,,
,, ,,	,, ,, ,,	,,	363 (77 + 286) ,,
,, ,,	,, ,, ,,	male	— (92 + regen.)

These are the first records of this species from Malawi. The type locality is Fwambo, near Abercorn, Zambia. The species has been recorded previously from grasslands of southern Tanzania and Angola, but little is known of its habits. The type specimen, in the British Museum of Natural History, was examined. It is much larger than any individual in our series.

Abundance and habitat preference. African game guards told us that these animals are common on the grassland.

Except for a juvenile taken inside the Zambian Rest House, all specimens were found on the grassland. Collections on November 7 and July 3 were flushed during grass-burning operations near the forestry depot. The Nganda female was killed as it crossed the road. The juvenile collected February 1 was in sparse sedges in a very wet dambo. Specimens were taken at different times during the day.

Reproduction. A pregnant female, collected November 27, contained four fetuses, each 140 mm. Young are about 145 mm. at birth.

Parasites. The large female, collected May 28, had many nematodes in the viscera.

Characteristics. Limbs are vestigial. A single short nail-like spine is in each forelimb position. A pair of short scaly projections ending in a spine are remnants of hind limbs. These are located just anterior and lateral to the vent. The tail is three to four times the body length. It is proportionately longer in males than in females. Scales are strongly keeled and large, almost foliaceous. Dorsal color is light brown or gray shading into the white venter. The venter of the largest male was yellow. Body movements are snake-like.

Diet. The stomach of the largest specimen contained grasshopper remains.

Family BOIDAE

Python sebae (Gmelin). African Python

Zambian Nyika	Aug. 1953

An 8-9 foot python was found by J. B. Shenton (personal communication); it was coiled in a hole in the ground at about 5,500 feet elevation. Vegetation was mixed grassland and tree heather (*Philippia*). Although this is lower than the major part of the Nyika grassland, the vegetation type is similar to that of marginal areas and evidently is a tongue of grassland extending down the western edge of the plateau.

Family COLUBRIDAE

Lycophidion capense (Smith). Wolf Snake

Zambian Rest House	Dec. 13, 1963	male	353 (315 + 38) mm.

The specimen contained a skink, *Mabuya striata.*

Pseudaspis cana (Linnaeus). Mole Snake

Zambian Rest House	1962	female	1295 (1130 + 165)mm.
Chelinda depot	Dec. 30, 1963	imm.	560 (493 + 67) „
Chelinda compound	June 2, 1964	male	1220 (980 + 240) „
Chelinda compound	June 8, 1964	male	1350 (1083 + 267) „

This large, handsome snake has been collected rarely in Malawi. Sir Harry Johnston provided the first records from Chiradzula and Zomba (Boulenger, 1896). The first recent specimen was taken by Sweeney (1963) near Neno, in the Kirk Range. Mole snakes are probably common in Malawi, but like so many other burrowing forms, are encountered rarely. Lack of records is doubtless due to paucity of collecting.

Abundance and habitat preference. Only four mole snakes have been collected on the plateau. The first was taken by the Zambian Rest House by Mrs. Frank Ansell (Wilson, 1965). Oliver Carey (personal communication) has seen two mole snakes during five years on the plateau, one near Chelinda Bridge and one near the Zambian Rest House. Males were taken during mid-day from a grassy plot between the compound buildings. The immature snake was found in early afternoon in the firebreak around the pine forest; it retreated to its hole when disturbed.

Reproduction. Semen was present in hemipenes of the male collected June 2.

Color variation. The immature, a female, had a distinct pattern of dark spots on a gray background. The pattern was much less distinct in adults; it was barely evident on the largest specimen. Adults were olive gray. Carey remembers his snakes as gold-colored individuals.

Behavior. Adults were very aggressive, but the young one made no attempt to bite when captured.

Duberria lutrix shirana (Boulenger). Shire Slug-eating Snake

Zambian Nyika	June, 1962	female	258 (218 + 40) mm.
„ „	Dec. 10, 1963	female	250 (213 + 27) „
„ „	Dec. 10, 1963	female	128 (103 + 25) „
Chelinda Depot	Dec. 30, 1963	juvenile	95 (76 + 19) „
„ „	Feb. 16, 1964	male	235 (210 + 25) „
Nyika barrier	Mar. 9, 1964	male (D.O.R.)	368 (316 + 52) „
Chelinda mudflow	Mar. 22, 1964	male	317 (249 + 68) „
Buma Hill	Apr. 27, 1964	female, gravid (D.O.R.)	322 (272 + 50) „

Abundance and habitat preference. The slug-eating snake is one of the most common on the Nyika. At least it is seen frequently, often as it crosses the road. Four individuals were captured near wooded areas, three near the margins of *Pinus patula* plantations. Another was seen in pine needle duff covering the ground just inside the edge of a pine plot. One was taken in a firebreak surrounding an evergreen forest patch, and two were collected on the open grassland.

Reproduction. The gravid female contained nine soft white eggs, 12× 6 mm. They were arranged linearly in the uterus, which filled the posterior half of the body. Sweeney (1961) says the Malawi population is sometimes oviparous whereas in other areas the species is ovoviviparous.

Behavior. These small snakes did not strike or bite when captured, but the juvenile coiled as if to strike.

Psammophylax tritaeniatus variabilis Günther. Montane Grass Snake

Zambian Nyika	Oct., 1962	male	569 (455 + 114) mm.
Chelinda depot	Nov. 8, 1963	male	560 (474 + 86) „
Chelinda area	Nov. 19, 1963		
Zambian Nyika	Dec. 10, 1963	male	633 (520 + 113) „
„ „	Dec. 10, 1963	male	643 (520 + 123) „
Chelinda-Rumpi stream	Dec. 10, 1963	male	700 (585 + 115) „
Chelinda-Rumpi stream	Dec. 11, 1963	female, pregnant	(510 + regen.)
Chelinda depot	Dec. 30, 1963	male	641 (520 + 121) „
Buma Hill	Jan. 31, 1964	male	242 (195 + 47) „
Chelinda area, road	Mar. 6, 1964	sighted	
Chelinda staff house	June 10, 1964	sighted	

Abundance and habitat preference. We found these snakes to be the most common on the Nyika. They were sometimes observed in the grass far from water but were seen most frequently in or near a wet area. The Zambian records are the first for that country although there have been numerous records from the Malawi Nyika.

Reproduction. A pregnant female, taken December 11, contained four well-developed young nearly ready to be born [154 (124 + 30) mm.]. Their pattern was distinct. The fetuses were arranged in line, each coiled inside the uterus. A large fimbriate yolk sac was attached to the umbilicus on scales 22-25 counting forward from the anal scale.

Unlike the lowland *P. t. tritaeniatus* Günther (Sweeney, 1961), this form seems to be ovoviviparous.

Behavior. None attempted to strike when captured; they moved quickly out of the way or retired to a nearby hole.

Diet. The stomach of one snake contained two *Rana* feet.

Rhamphiophis oxyrhynchus rostratus Peters. Beaked Snake

Zambian Rest House	Dec. 12, 1963	male	356 (255 + 101) mm.

This species was also collected on the Nyika at a locality over 7,000 feet, by R. C. H. Sweeney (1961). Most Malawi records are from lowlands of the Southern Region.

Dasypeltis scabra scabra Linnaeus. Egg-eating Snake

Zambian Nyika .. .. Aug. 20, 1962 .. male .. .. .. 534 (430 + 104) mm.

The snake was found under a stone on a rocky outcrop at some distance from the nearest forest patch. This is surprising since it is a semi-arboreal form. Previous Malawi records are from the lowlands up to about 4,000 feet (Sweeney, 1961).

Family VIPERIDAE

Atheris nitschei rungweensis Bogert. Rungwe Bush Viper

Zambian Nyika .. .. June 1962 .. .. female .. .. .. 522 (450 + 72) mm.

Mr. J. M. Feely collected this bush viper in a firebreak surrounding an evergreen forest patch at about 6,000 feet (Wilson, 1965). This record extends the range of the species approximately 50 miles south of previous records. Other Malawi records are from the margin of the Matipa forest in the Misuku mountains (Loveridge, 1953a).

NEW NYIKA RECORDS

New records which we have added since the Loveridge listings (1953a, b) are the following:

Xenopus l. laevis.
Bufo pusillus.
Ptychadena porosissima.
Ptychadena uzungwensis.
Hyperolius n. nasutus.
Hyperolius mertensi.
Chamaesaura miopropus.
Python sebae.
Lycophidion capense
Pseudaspis cana.
Atheris nitschei rungweensis.

ADDITIONAL COLLECTIONS

The following twenty-one species have been recorded from the Nyika (Loveridge, 1953a). Records were based on early collections reported by Boulenger and these species except for *Boaedon f. fuliginosus* have not been collected on the plateau since the late 1800's.

Hemidactylus mabouia (Jonnés)—House Gecko.
Agama hispida armata Peters—Zambezi Spiny Agama.
Chamaeleo dilepis dilepis Leach—Flap-necked Chameleon.
Ablepharus wahlbergii (Smith)—Savanna Snake-eyed Skink.
Riopa johnstoni (Boulenger)—Legless Skink
Cordylus cordylus tropidosternum (Cope)—Eastern Girdle-tail.
Gerrhosaurus flavigularis flavigularis Wiegmann—Yellow-throated Plated Lizard.
Latastia johnstoni Boulenger—Nyasaland Long-tailed Lizard.

Natriciteres olivacea olivacea (Peters)—Olive Marsh Snake.
Boaedon fuliginosus fuliginosus (Bore)—House Snake.
Philothamnus irregularis irregularis (Leach)—Green Water Snake.
Philothamnus semivariegatus semivariegatus (Smith)—Spotted Bush Snake.
Telescopus semiannulatus semiannulatus Smith—Tiger Snake.
Crotaphopeltis hotamboeia hotamboeia (Laurenti)—Savanna White-lipped Snake.
Hemirhagerrhis nototaenia nototaenia (Günther)—Dark-spotted Snake.
Dromophis lineatus (Duméril and Bibron)—Lined Snake.
Psammophis subtaeniatus sudanensis Werner—Northern Stripe-bellied Sand Snake.
Theltornis kirtlandii capensis Smith—Cape Vine Snake.
Dispholidus typus (Smith)—Boomslang.
Causus rhombeatus (Lichtenstein)—Common Night Adder.
Bitis arietans arietans (Merrem)—Puff Adder.

Loveridge assumed some of those species came from lower elevations on the escarpment or from areas surrounding the plateau. Some will be found on the plateau as more field work is done, and in time new records will be added.

ENDEMIC SPECIES

The Nyika Plateau is approximately 2,500 feet higher than any of the surrounding highlands. Since it is a montane "island," a number of forms have evolved on the plateau and are at present restricted to it. There are several plants, birds, and mammals known only from the Nyika (Benson, 1954; Cater, 1954; Lemon, 1964). Amphibians and reptiles presently known only from the Nyika are:

Bufo taitanus nyikae.
Hyperolius mertensi.
Arthroleptis xenodactyloides nyikae.
Mabuya hildae.
Mabuya varia nyikae.

Broadley (personal communication) questions the taxonomic status of the last two forms which may be no more than local races. Although *Phrynobatrachus ukingensis mababiensis* on the Nyika is not different enough from other populations to be considered a different subspecies, it does show signs of incipient speciation on the plateau. With the accumulation of knowledge, based upon more widespread collections, it may be found that some of the Nyika endemics occur elsewhere as well.

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